Calcareous Fossil Algae

Limestone-Building Algae and Algal Limestones. J. Harlan Johnson. Colorado School of Mines, Golden, 1961. xi + 297 pp. Illus. $6.75.

It is particularly fitting that an outstanding authority on the subject prepared this introductory survey of calcareous fossil algae. The fossils are important because, in addition to their contribution to a knowledge of algal phylogeny, many are significant stratigraphic markers. Moreover, to geologists they are useful indicators of relatively shallow, clear water and marginal environments. It is of economic significance that calcareous algae sometimes played a conspicuous role in the formation of porous rock in reefs and related structures, potential reservoirs for petroleum and sites for the deposition of minerals from circulating solutions.

Although the book is not offered as an exhaustive treatment of these fossils, it covers the most important genera and provides a good guide to more detailed literature. Brief descriptions are supplemented by illustrations profuse enough to occupy more than a third of the book's pages—a most useful feature. There are critical remarks on many genera, and data is provided on the geologic range and the geographic distribution of all the fossils mentioned. Short general discussions cover classification, ecology, and the formation of rocks by algae. Much information is presented concisely in tables, and there are keys to assist in the identification of a few families and genera. Useful lists of genera that occur in each geologic period are appended. Although these lists contain an impressive number of calcareous algae and include a few noncalcareous genera, many of the algae are not otherwise mentioned; since the lists are not classified and there are no references to descriptions, their value to the nonspecialist is reduced. Figure numbers were omitted from several plates. Presumably, one should view plates 49 and 50 through a stereoscope, but this is not stated in the legends and the apparent duplication of figures may puzzle some readers.

But these are minor criticisms of a compact, attractively produced book that will be useful to both geologists and botanists.

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Electrochemistry

Advances in Electrochemistry and Electrochemical Engineering. vol. 1, *Electrochemistry*. Paul Delahay, Ed. (335 pp.); vol. 2, *Electrochemical Engineering*. Charles W. Tobias, Ed. (309 pp.). Interscience (Wiley), New York, 1962. Illus. $12 each.

The increasing interest in fundamental electrochemistry (particularly in electrode kinetics) and the growing importance of applications (fuel cells, semiconductors, and the like) have already resulted in the publication of a series entitled *Modern Aspects of Electrochemistry* edited by J. O'M. Bockris (1954 and 1959); we are now offered a new series *Advances in Electrochemistry and Electrochemical Engineering* (volume 1, on electrochemistry, is edited by Delahay and volume 2, on electrochemical engineering, by Tobias; the contents of volume 3 have been announced).

This is all to the good, but what is still lacking is an up-to-date, authoritative treatise on the fundamentals of electrochemistry which would provide at least a basic discussion of electrode kinetics. In my opinion the generally unquestioned acceptance of empirical procedures (in connection with the role of the transfer coefficient for example) and of Tafel-like formulas for current-potential relations mar much of the current literature on electrode kinetics, including (in volume 1 of *Advances*) the otherwise excellent contributions by R. Parsons, on the influence of double-layer structure on electrode kinetics, and by A. N. Frumkin, on hydrogen overvoltage and absorption on mercury.

M. Breiter's brief discussion of oxygen overvoltage is, at best, an entering wedge into a very complex problem. H. Gerischer's detailed discussion of semiconductor electrodes is a most welcome and useful contribution. P. Delahay's inexhaustible ingenuity is particularly well displayed in his presentation of relaxation methods applied to the study of fast electrode processes.

In volume 2, C. Wagner gives a lucid outline of the scope of electrochemical engineering, including suggestions for the handling and presentation of data on mass transfer and current distribution. R. E. Meredith and C. W. Tobias present a thorough treatment of conduction in heterogeneous systems. N. Ibl discusses in great detail (there are 505 references to the literature and patents!) the application of mass transfer theory to the formation of powdered metal deposits; O. Kardos and D. G. Foulke apply the same theory to electrodeposition on small-scale profiles. In the final paper M. Eisenberg presents a condensed but clear discussion of the design and scale-up of electrochemical fuel cells.

There is no question about the value and timeliness of these contributions. The editing is, in general, quite good, and the physical presentation is clear and attractive. The bibliographies are all extensive and reasonably up-to-date. Each volume is provided with a fairly adequate index. Occasional discrepancies in symbols between text and figures, misprints in formulas, and lapses from good English are understandable when one remembers the complex circumstances under which such material is assembled.

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Many-Electron Systems

Orbitals in Atoms and Molecules. C. K. Jørgensen. Academic Press, New York, 1962. vii + 162 pp. Illus. $6.

Jørgensen's short book treats various common features of many-electron systems which occur in atomic spectroscopy and in less complicated molecules that are mainly inorganic in nature. The 12 chapters are: "Well-defined electron configurations," "Degenerate orbitals in high symmetry," "Correlation effects," "Octahedral symmetry," "Systems with large internuclear distances," "Equivalent orbitals and microsymmetry," "Electronegativity and chemical bonding," "How to identify absorption spectra," "Energy levels of crystals," "Electrodynamic [relativistic] effects," "Lanthanides and 5f elements," and "X-ray spectra."

The author's original contributions to the field coupled with those of other workers enable him to successfully provide a unified presentation of the usefulness of electron configurations as a classification of the symmetry types and relative order of low-lying excited energy levels, so important in inorganic complexes. The book is characterized by critical analyses of a number of original contributions published in journals, and many thought-provoking,